

06-05-00

A

NEW, CONTINUATION, DIVISIONAL OR  
CONTINUATION-IN-PART APPLICATION  
UNDER 37 C.F.R. §1.53(b)

Attorney Docket No. 3165A-000010

Express Mail Label No. EL 486 600 481 US

Date June 2, 2000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Hon. Commissioner of Patents and Trademarks  
Washington, D. C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R. §1.53(b) is a patent application for BROWSER-ENABLED REMOTE USER INTERFACE FOR TELECOMMUNICATIONS POWER SYSTEM

identified by: ☐ First named inventor \_\_\_\_\_  
or ☒ Attorney Docket No. (see above)

1. Type of Application

☒ This application is a new (non-continuing) application.

☐ This application is a ☐ continuation / ☐ divisional / ☐ continuation-in-part of prior application No. \_\_\_\_\_. Amend the specification by inserting before the first line the sentence:

--This is a [continuation/division/continuation-in-part] of United States patent application No. \_\_\_\_\_, filed \_\_\_\_\_.--

☐ The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

If for some reason applicant has not requested a sufficient extension of time in the parent application, and/or has not paid a sufficient fee for any necessary response in the parent application and/or for the extension of time necessary to prevent the abandonment of the parent application prior to the filing of this application, please consider this as a Request for an Extension for the required time period and/or authorization to charge our Deposit Account No. 08-0750 for any fee that may be due. THIS FORM IS BEING FILED IN TRIPLICATE: one copy for this application; one copy for use in connection with the Deposit Account (if applicable); and one copy for the above-mentioned parent application (if any extension of time is necessary).

2. Contents of Application

a. Specification of 25 pages;

- ☐ A microfiche computer program (Appendix);  
☐ A nucleotide and/or amino acid sequence submission;

☐ Because the enclosed application is in a non-English language, a verified English translation ☐ is enclosed ☐ will be filed.

☐ Cancel original claims \_\_\_\_\_ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing date purposes.)

b. ☒ Drawings on 6 sheets;

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- c. ☒ A signed Oath/Declaration ☐ is enclosed / ☒ will be filed in accordance with 37 C.F.R. §1.53(f).

The enclosed Oath/Declaration is ☐ newly executed / ☐ a copy from a prior application under 37 C.F.R. §1.63(d) / ☐ accompanied by a statement requesting the deletion of person(s) not inventors in the continuing application.

d. **Fees**

| FILING FEE   | Number    |  |  |  | Number |  |  |  | Basic Fee  |  |  |          |          |  |  |  |
|--|-----------|--|--|--|--------|--|--|--|------------|--|--|----------|----------|--|--|--|
| CALCULATION  | Filed     |  |  |  | Extra  |  |  |  | Rate       |  |  |          | \$690.00 |  |  |  |
| Total Claims   | 28 - 20 = |  |  |  | 8 x    |  |  |  | \$18.00 =  |  |  |          | \$144.00 |  |  |  |
| Independent Claims   | 3 - 3 =   |  |  |  | 0 x    |  |  |  | \$78.00 =  |  |  |          | -0-      |  |  |  |
| Multiple Dependent Claim(s) Used.....  |           |  |  |  |        |  |  |  | \$260.00 = |  |  |          |          |  |  |  |
| FILING FEE - NON-SMALL ENTITY .....  |           |  |  |  |        |  |  |  |            |  |  | \$834.00 |          |  |  |  |
| FILING FEE - SMALL ENTITY: Reduction by 1/2 .....                              |           |  |  |  |        |  |  |  |            |  |  |          |          |  |  |  |
| <input type="checkbox"/> Verified Statement under 37 C.F.R. §1.27 is enclosed. |           |  |  |  |        |  |  |  |            |  |  |          |          |  |  |  |
| <input type="checkbox"/> Verified Statement filed in prior application.        |           |  |  |  |        |  |  |  |            |  |  |          |          |  |  |  |
| Assignment Recordal Fee (\$40.00) .....  |           |  |  |  |        |  |  |  |            |  |  | \$40.00  |          |  |  |  |
| 37 C.F.R. §1.17(k) Fee (non-English application).....                          |           |  |  |  |        |  |  |  |            |  |  |          |          |  |  |  |
| TOTAL .....  |           |  |  |  |        |  |  |  |            |  |  | \$874.00 |          |  |  |  |

- ☐ A check is enclosed to cover the calculated fees. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 08-0750. A duplicate copy of this document is enclosed.

- ☒ The calculated fees will be paid within the time allotted for completion of the filing requirements.

- ☐ The calculated fees are to be charged to Deposit Account No. 08-0750. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to said Deposit Account. A duplicate copy of this document is enclosed.

3. **Priority Information**

- ☐ **Foreign Priority:** Priority based on \_\_\_\_\_ Application No. \_\_\_\_\_, filed \_\_\_\_\_, is claimed.

- ☐ A copy of the above referenced priority document ☐ is enclosed / ☐ will be filed in due course, pursuant to 35 U.S.C. §119(a)-(d).

- ☐ **Provisional Application Priority:** Priority based on United States Provisional Application No. \_\_\_\_\_, filed \_\_\_\_\_, is claimed under 35 U.S.C. §119(e).

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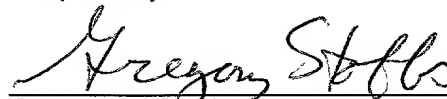
4. Other Submissions

- ☐ A Preliminary Amendment is enclosed.
- ☐ An Information Disclosure Statement, \_\_\_\_\_ sheets of PTO Form 1449, and \_\_\_\_\_ patent(s)/publications/documents are enclosed.
- ☐ A power of attorney
- ☐ is submitted ☐ with the new Oath/Declaration.
- ☐ is of record in the prior application and ☐ is in the original papers / ☐ a copy is enclosed.
- ☐ An Assignment of the invention
- ☐ is enclosed with a cover sheet pursuant to 37 C.F.R. §§3.11, 3.28 and 3.31.
- ☐ is of record in a prior application. The assignment is to \_\_\_\_\_, and is recorded at Reel \_\_\_\_\_, Frame(s) \_\_\_\_\_.
- ☐ An Establishment of Assignee's Right To Prosecute Application Under 37 C.F.R. §3.73(b), and Power Of Attorney is enclosed.
- ☒ An Express Mailing Certificate is enclosed.
- ☒ Other: Acknowledgment postcard.

Attention is directed to the fact that the correspondence address for this application is:

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Respectfully,

  
\_\_\_\_\_  
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Hon. Commissioner of Patents  
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Washington, D.C. 20231

Sir:

**EXPRESS MAILING CERTIFICATE**

Applicant: Marc Iavergne;  
Louis Duguay;  
Christian deVarennnes

Serial No (if any): not yet assigned

For: BROWSER-ENABLED REMOTE USER INTERFACE FOR  
TELECOMMUNICATIONS POWER SYSTEM

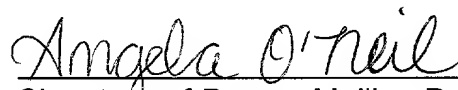
Docket: 3165A-000010

Attorney: Gregory A. Stobbs

"Express Mail" Mailing Label Number ..... EL 486 600 481 US

Date of Deposit ..... June 2, 2000

I hereby certify and verify that the accompanying transmittal letter (in triplicate); 25-page patent application; unsigned Declaration and Power of Attorney; and six (6) sheets of drawings are being deposited with the United States Postal Service "Express Mail Post Office To Addressee" service under 37 C.F.R. 1.10 on the date indicated above and are addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.



Signature of Person Mailing Document(s)

# **BROWSER-ENABLED REMOTE USER INTERFACE FOR TELECOMMUNICATIONS POWER SYSTEM**

## 5                   **BACKGROUND AND SUMMARY OF THE INVENTION**

          The present invention relates generally to power systems for  
telecommunications equipment and networks. More particularly, the invention  
relates to a distributed user interface technology to simplify the operation and  
control of power supply systems for telecommunications and networking  
10   applications.

          The power system of a typical telephone central switching station or  
Internet routing station is a complex, modular system employing one or more  
rectifier subsystems and one or more power distribution subsystems connected  
through a common bus. Also, many power supply systems today have a  
15   controller that coordinates the operation of the rectifier and distribution  
subsystems. Frequently telecommunications systems require backup power,  
which is typically supplied through a large bank of storage batteries.

          Interacting with this complex assemblage of components has heretofore  
required a fairly high level of technical skill. Skilled engineers are expensive.  
20   When it is necessary to make adjustments to the power supply system, or to  
monitor operating parameters and make appropriate configuration adjustments,  
traditionally the engineer or technician must visit the site where the power supply  
system is located so that the operating conditions may be observed and  
appropriate action taken. While some large installations may have engineers or  
25   technicians on staff, many smaller installations, particularly those located in rural  
areas, are normally unmanned. While it is possible to schedule routine



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technicians make such upgrades, they need a clear, easy to use interface through which they will set the operating parameters of the newly added equipment. If any real-time values, reflecting operating currents, voltages, temperatures and the like, are not within expected ranges, the engineer needs  
5 to be able to quickly identify the cause.

The present invention provides a remote user interface system that will allow a remote browser application to monitor and control the power system from anywhere in the world. The interface system further supports a local user interface, such as in the form of a liquid crystal display screen and touchpad  
10 interface, to provide the same information that is available through the remote browser. Preferably the local interface and the remote browser interface are configured as a series of menu screens providing both static and dynamic (real-time) information. Preferably the screens of the remote browser interface and the local interface are of the same or similar layout so that the user of the remote  
15 browser interface will be familiar with the local interface, and vice versa.

The remote user interface system employs a monitor and control system that is coupled to the electric power supply system for obtaining operating state information from at least one of the subsystems of the power supply. The monitor and control system also provides operating state information to at least one of  
20 the subsystems of the power supply. A data storage system associated with the monitor and control system stores the state information. A user interface manager is coupled for accessing the data storage system. In the preferred embodiment the user interface manager can both read from and write to the data

storage system, thereby datalogically linking the user interface manager with the power supply subsystems.

The user interface manager is operative to deliver an executable Java applet to the remote browser application. The applet generates a user interface within the browser application for monitoring and controlling the electric power supply system. In the preferred embodiment the user interface manager is configured to supply selected state information to the applet for display by the remote browser within the remote user interface. The user interface manager is further configured to receive data values generated by the applet in response to user interaction through the user interface. It communicates these data values to the data storage system for use in controlling the electric power supply system.

Further in accordance with the invention, the remote user interface system generates a plurality of linked pages containing both static text and/or graphical information and also dynamic (real-time) information. The real-time information reflects actual operating conditions within the power supply system, such as voltages, currents, temperatures, time intervals, and the like. This dynamically-displayed content also represents active regions with which the user may interact. For example, the user can select an active region, such as a voltage, by manipulating the user interface cursor until it points to that region. Then, by selecting or clicking on the region, a subsequent page is automatically displayed, showing additional static and/or dynamic information that has a potential bearing on the real-time data previously displayed. Thus, if the user wishes to ascertain why a particular operating voltage is too high, he or she



simply clicks on the displayed voltage value and a subsequent screen is displayed, showing control settings and other parameters that have an effect on that operating voltage. Thus the user interface is quite intuitive and easy to use.

For a more complete understanding of the invention, its objects and advantages, refer to the following specification and to the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of an exemplary electric power supply system, illustrating how the modular subsystems may be configured;

Figure 2 is a software layer diagram illustrating the software environment in which the presently preferred remote user interface system may be implemented;

Figure 3 is data flow diagram illustrating a presently preferred embodiment of the user interface system;

Figure 4 is a block diagram illustrating the inter-module interface whereby components of the remote user interface system communicate with one another;

Figure 5 is a set of user interface diagrams, illustrating how active and static regions are linked in the presently preferred remote user interface system and

Figure 6 is a data structure diagram illustrating the messaging technique employed by the remote user interface applet when communicating with the remote access module of a local master control unit.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An exemplary power supply system is illustrated at **10** in Figure 1. The system of the illustrated embodiment employs a rackmount unit having mounting rails **12** that supports a common bus structure that includes a data bus **14** and a DC power bus **15** to which a plurality of individual power supply system components are attached. Illustrated in Figure 1 is a modular battery connection unit **16** connected through suitable heavy duty cables **18** to a battery supply **20**. A modular power distribution unit **22** houses a plurality of individual circuit breakers **24**, which supply operating power to the telecommunications equipment **26**. The system also includes a modular master control unit **28** and a plurality of modular rectifier units **30** (four rectifier units are illustrated in Figure 1).

The master control unit **28** has a local user interface, preferably in the form of a display panel **30**, such as an LCD panel and a touchpad pointing device **32**. The user interacts with the local user interface by manipulating the touchpad **32** to, in turn, manipulate the cursor **34** displayed on panel **30**. By tapping the touchpad or pressing the left and right selector buttons **36**, the user can select various menu screens to control the power supply system as will be more fully described below.

The master control unit is coupled through a suitable interface to a computer network such as the Internet. In Figure 1 the network has been generically illustrated at **36** and the master control unit is shown connected through a telephone interface jack **38** to the telecommunications unit **26**. While a telephone connection has been illustrated here, it will be appreciated that the

master control unit could be connected to network **36** by other types of connections.

In accordance with one aspect of the invention a remote user interface is provided through a suitable computer or workstation such as computer **40**.

5 Computer **40** is attached to network **36** so that it may communicate with the master control unit **28** through the network connection provided. Computer **40** hosts a browser application, such as a web browser application, which in turn runs a remote user interface applet. The applet provides connectivity with the master control unit **28** and allows the user to fully interact with the control unit  
10 through the remote browser interface.

In the presently preferred embodiment, the power supply units illustrated in Figure 1 are designed for modular interconnectivity. Each of the modular units includes supporting hardware and software for communicating over data bus **14**. While the modular units are capable of peer-to-peer communication, the  
15 presently preferred embodiment places the primary control functions within the master control unit **28**. The reserve power unit **16**, power distribution unit **22** and rectifier units **30** are provided with processors, referred to as "neurons," that handle the monitoring, control and communications functions associated with these modules. The master control unit includes a more powerful processor that  
20 runs the controller software that coordinates operation of the other modules as well as providing the user interface functionality.

The presently preferred embodiment employs a networked connection between the processor of the master control unit and the neurons of the other modules that make up the system. Communication is effected over bus **14** using

the CAN bus protocol. The master control unit and each of the neurons associated with the other modules contain the necessary hardware and driver software for communicating over the CAN bus. Although other protocols may be used, the CAN bus protocol is presently preferred because it is relatively robust in the presence of electrical noise such as would be expected in a power system.

To better understand how the remote user interface works, an overview of the presently preferred software architecture for the master controller will be presented. Referring to Figure 2, the software architecture may be defined in terms of three interacting layers: low level layer **100**, real-time layer **102** and user interface layer **104**. Although other operating systems may be used, the presently preferred embodiment uses the QNX operating system which provides a real-time multitasking environment. The low level layer **100** consists of the low level drivers for communication and hardware interface, such as modem, Ethernet, RS-232, CAN, LCD display, pointing device, I/O interface, flash memory, watchdog and trace/log. Layer **100** provides services to the real-time layer **102** through an application programming interface (API). In this way, applications running in the real-time layer may be decoupled from hardware platform dependence.

Real-time layer **102** provides monitor and control functions for each of the reserve power module, power distribution module and rectifier modules as well as plant voltage and current monitoring and control functions applicable to the entire power supply system. In addition, alarm condition monitoring and diagnostic functions and software upgrade functions are provided in real-time layer **102**.

User interface layer **104** provides the functionality for supporting both local and remote user interface control of the modules in the real-time layer **102**. The preferred embodiment implements remote access through a web-based user interface through either an Ethernet or modem connection using TCP/IP and modem drivers found in layer **100**.

The user interface layer and the real-time layer communicate through access to a shared database **107** that is administered by database manager **106**. Figure 4 illustrates how the various modules within layers **102** and **104** communicate via the database manager **106**. The database manager implements a "soft" data bus **108** which provides a communication backbone within the controller software. The soft data bus enables module plugability, making it easy to add additional modules when upgrading or enhancing the controller software. Modules connected to the database manager (and thereby connected to the soft data bus **108**) interact with each other by reading from and writing to the database **107** being administered by database manager **106**.

Thus if the user wishes to access an alarm diagnostic value, for example, the user would interact through the user interface manager **110** (a component within layer **104**) to read the alarm diagnostic values obtained from the database **107** by database manager **106**. The alarm diagnostic module **112** operating in conjunction with alarm input/output module **114** (a component within layer **102**) is responsible for writing values to database **107** that are accessed by the user interface manager when interrogating the alarm diagnostic conditions.

By way of further example, if the user wishes to ascertain the current power plant voltage, the user interface manager **110** is again used. This time the

user interface manager will request database manager **106** to obtain values stored in database **107** that have been written to the database by the plant voltage/current monitor and control module **116**. Similar connectivity is provided between the user interface manager and software upgrade module **118**, power distribution monitor and control module **120**, reserve power monitor and control module **122**, rectifier monitor and control module **124** and neuron manager **126**.

Figure 3 provides a different view of how the modules within the presently preferred software architecture interact with one another to provide the remote user interface functionality. Figure 3 is a dataflow diagram in which communication between modules is illustrated using interconnecting lines with double-headed arrows and in which associations or relationships between modules and/or components are shown by lines without arrows. Database manager **106** and its associated database **107** are illustrated in the center of the diagram. The user interface manager **110** and the various monitor and control modules **116**, **120**, **122** and **124** communicate with the database manager. The rectifier monitor and control module **124**, in turn, communicates with the rectifier unit **30**; reserve monitor and control module **122** communicates with the reserve power unit **116**; and distribution and control module **120** communicates with the distribution unit **22**. AC power is supplied from the AC mains to the rectifier unit(s) **30**, which in turn supply DC power over the DC power bus to both the reserve power unit **16** and the distribution unit **22**. Thus energy from the rectifier units is supplied to both power any loads attached to the distribution unit through breakers **24** and also to maintain the reserve power batteries at full charge. In the event the AC mains are lost, due to a power outage, the reserve power unit

16 supplies DC power via the DC power bus 15 to the distribution unit 22 so that the loads will continue to operate uninterrupted.

The user interface manager 110 supports both local and remote interface functionality. Local interface functionality is provided through a local graphical user interface (GUI) module 150 while remote user interface functionality is provided through a remote access module 152. The remote access module will support multiple communication sessions concurrently. For each communication session a graphical user interface (GUI) daemon 154 is instantiated. The presently preferred remote user interface is designed to work using the TCP/IP protocol employed by the Internet. The GUI daemon 154 processes TCP/IP packets, packaging information sent by remote access module 152 over the network 36 and unpackaging packets sent to the remote access module from the network 36.

The local GUI module 150 is designed to receive user input through a touchpad 32 having pushbuttons 36 to simulate the right and left mouseclick buttons of a computer graphical user interface. The local GUI 50 also works with display panel 30 on which a graphical cursor 36 is displayed. The user can make menu selections by manipulating the cursor using touchpad 32. In the illustrated embodiment menus are accessible through a button 160 in the lower left-hand corner of the screen. The user can also select navigation buttons 162 that simulate the Home, Back and Forward buttons commonly found on web browsers. The user can also select displayed text that appears in the center portion of the display screen as at 164. The displayed text can either be static text that does not change during system operation or dynamic text that does

change during system operation. Typically the dynamic text is tied to real-time values measured by one of the monitor and control modules (e.g. modules **116**, **120**, **122** and **124**) or from the alarm and diagnostic modules (e.g. modules **112** and **114**).

5           Clicking on or selecting a dynamically displayed value, such as the float voltage value, for example, causes the user interface manager to display a different screen that is relevant to the float voltage value. Thus, clicking on the numeric value "-54.5" in the illustrated local display **30** would cause a new screen to be displayed showing other measured values and parameters that affect the float voltage. The user could then make changes to these settings by selecting new settings from a pull-down menu box or other graphical user interface input technique. The new setting would then be communicated through the user interface manager to the database manager **106** for entry into database **107**. The monitor and control module or modules that use this setting would then access the database to obtain the new setting and make adjustments to the appropriate modules as needed to effect the new setting. This could in turn cause changes in measured values (e.g., float voltage) which would be communicated by the respective monitor and control modules to the database manager for writing into the database **107**.

20           An exemplary set of user interface screens has been illustrated in Figure 5. From the main graphical user interface screen **200**, the user can navigate to a variety of different screens. Five subscreens are illustrated in Figure 5. Clicking on the dynamically displayed value for temperature compensation takes the user to screen **202** where various voltage thresholds can be set. Clicking on the





memory ROM, flash memory or the like. Such memory is illustrated diagrammatically at **222** in Figure 3.

The remote user interface applet is downloaded by the user interface manager through the remote access module **152** to the workstation or computer **40**. Computer **40** may run a standard web browser and may be suitably connected to network **36** to support TCP/IP communication. If the connection to network **36** is by modem, additional PPP protocols may be used to establish the Internet connection. Once the remote applet is downloaded to computer **40** it runs in the memory of computer **40** as illustrated diagrammatically at **224**.

The remote user interface applet provides several functions. First, it generates the static display screens (text and graphics) to mimic the appearance of the screens on the local user interface. Of course, because computer **40** will typically have a larger display area than the local display, the remotely displayed user interface can have additional displayed content as well. The remote user interface applet is also involved in displaying dynamically generated information and for sending control information back to the master control unit. When the user wishes to read a value within the power supply system, or wishes to change a setting or value, used by the power supply system, the user interacts with the remote user interface screen. The applet, in turn, constructs a message that identifies not only the parameter or setting entered by the user, but also the screen descriptor and field identifier so that the context of the user's entry may be fully defined. The remote user interface applet then packages this message in a TCP/IP packet or series of packets and sends it through the network to the remote access module **152**.

Once received by the remote access module the associated GUI daemon  
154 unpacks the TCP/IP message, extracts the enclosed message sent by the  
remote user interface applet and passes this information to the user interface  
manager. The user interface manager then interprets the message by parsing  
5 it into its constituent parts. At this point, the user interface manager uses the  
constituent part information the same way as it would use information from the  
local GUI module 150.

Figure 6 diagrammatically illustrates how the remote user interface applet  
may package a request for information, such as a request for a particular voltage  
10 value stored in database 107. The remote user interface applet generates screen  
300, which may have a screen identifier I.D. value of SCR 47. The requested  
voltage value may be physically located in a dynamically changing field 302 at  
(X,Y) position (10, 5). The remote user interface applet would thus construct  
message 304 to embed the screen identifier, the X and Y position values, and  
15 optionally a setting or value to be communicated to the master control unit 28.  
In this case, the particular message being sent is a request for information from  
the database. Thus a suitable request information code may be embedded in  
message 304.

The remote user interface applet then packages message 304 within a  
20 TCP/IP packet 306 and the packet is sent over the Internet or other suitable  
connection to the remote access module 152 within the master control unit (Fig.  
3). The GUI daemon 154 associated with the remote access module unpacks the  
message 304 and the user interface manager then parses the message to  
determine that the user is on screen 47 at X,Y location (10, 5). Because the

message is a request for information, the user interface manager passes the request to database manager **106** for a database lookup operation. The database manager obtains the current value of the requested information and passes it back to the user interface manager, which in turn passes the value to  
5 the remote access module **152**. The remote access module then, using the services of GUI deamon **154**, constructs a reply message **308** that contains the screen I.D., the X and Y values and the requested value obtained by database lookup. In the example illustrated in Figure 6, the requested information is a voltage: 54.4V.

10 The remote access module bundles message **308** within a TCP/IP packet or packets **310** and the packet is sent back to the remote user interface applet **224** so that the value may be displayed in field **302** of the display screen **300**. In this way, the remote user interface applet is able to obtain values reflecting current operating conditions from the master control unit. The applet can also  
15 send operating parameters, such as those input by the user through a suitable dialogue box, pull-down menu, radio button or the like. To send control values to the master control unit the remote user interface applet constructs a message similar to that shown at **304**, except that the command would be an instruction to write a value to the database and would provide the appropriate value as  
20 supplied by the user. The remote access module would then unpack the message at the master control unit and place that value in the database for use by the other modules.

From the foregoing it will be appreciated that the user interface of the invention provides a powerful graphical user interface for convenient control of

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a power supply system by both a local operator and a remote operator through  
a suitable web browser. Because the remote user interface and the local user  
interface offer the same functionality, knowledge obtained at either a local facility  
or a remote facility is easily transferred to the other facility. Thus an engineer  
5 working at a local power supply site would readily be able to interact with the  
system through a remote web browser connection without having to learn a new  
user interface. By being able to interrogate a number of different facilities from  
a single web browser at a remote location, one engineer can now do the job of  
many. This can significantly lower the cost to operate a power supply system  
10 within a telecommunications operation.

While the invention has been described in its presently preferred form, it  
will be understood that the invention is capable of modification without departing  
from the spirit of the invention as set forth in the appended claims.

## CLAIMS

What is claimed is:

1. A remote user interface system to enable a remote browser application to monitor and control a power system of the type having one or more rectifier subsystems, one or more reserve power subsystems and one or more power distribution subsystems, comprising:

5 a monitor and control system coupled to said power system for obtaining operating state information from at least one of said subsystems and for providing operating state information to at least one of said subsystems;

a data storage system associated with said monitor and control system for storing said state information; and

10 a user interface manager capable of accessing said data storage system and being operative to:

(a) provide an executable applet to said remote browser application, the applet generating a user interface within said browser application for monitoring and controlling said electric power supply system;

15 (b) supply selected state information to said applet for display by said remote browser within said user interface; and

(c) receive data values generated by said applet in response to user interaction via said user interface and to communicate said data values to said data storage system for use in controlling said electric power system.

2. The remote user interface system of claim 1 wherein said user interface manager communicates with said applet using data packets compatible with the internet protocol.

3. The remote user interface system of claim 1 wherein said user interface manager also supports a local user interface associated with said monitor and control system.

4. The remote user interface system of claim 1 wherein said user interface manager also supports a local user interface that includes a touchpad input mechanism for user interaction with the power system.

5. The remote user interface system of claim 1 further wherein said user interface manager generates at least one display screen containing both static and dynamic content.

6. The remote user interface system of claim 5 wherein said dynamic content represents said state information.

7. The remote user interface system of claim 1 wherein said user interface manager generates at a plurality of display screens, at least a portion of which contain dynamic content representing said state information, and wherein at least one of said applet and said user interface manager generates hyperlinks connecting said dynamic content with other display screens.

8. The remote user interface system of claim 1 wherein said monitor and control system includes a rectifier monitor and control module for obtaining operating state information from at least one of said rectifier subsystems.

30 9. The remote user interface system of claim 1 wherein said monitor and control system includes a reserve monitor and control module for obtaining operating state information from batteries attached to said power system.

35 10. The remote user interface system of claim 1 wherein said monitor and control system includes a distribution monitor and control module for obtaining operating state information from said power distribution subsystem.

40 11. The remote user interface system of claim 1 wherein said remote browser application is an internet web browser application.

12. A remote user interface system to enable a remote browser application to monitor and control a power system, comprising:

45 a monitor and control system coupled to said power system for obtaining operating state information about said power supply system and for providing operating state information to said power system;

a data storage system associated with said monitor and control system for storing said state information; and

a user interface manager capable of accessing said data storage system and being operative to provide an executable applet to said remote browser application, the



50 applet generating a user interface within said browser application for monitoring and  
controlling said power system.

13. The remote user interface system of claim 12 wherein said user interface  
55 manager communicates with said applet using data packets compatible with the internet  
protocol.

14. The remote user interface system of claim 12 wherein said user interface  
manager also supports a local user interface associated with said monitor and control  
60 system.

15. The remote user interface system of claim 12 wherein said user interface  
manager also supports a local user interface that includes a touchpad input mechanism  
65 for user interaction with the power system.

16. The remote user interface system of claim 12 further wherein said user  
interface manager generates at least one display screen containing both static and  
dynamic content.

70 17. The remote user interface system of claim 16 wherein said dynamic  
content represents said state information.

18. The remote user interface system of claim 12 wherein said user interface  
manager generates at a plurality of display screens, at least a portion of which contain

75 dynamic content representing said state information, and wherein at least one of said  
user interface manager and said applet generates hyperlinks connecting said dynamic  
content with other display screens.

19. The remote user interface system of claim 12 wherein said monitor and  
80 control system includes a rectifier monitor and control module for obtaining operating  
state information from at least one of said rectifier subsystems.

20. The remote user interface system of claim 12 wherein said monitor and  
control system includes a reserve monitor and control module for obtaining operating  
85 state information from batteries attached to said power system.

21. The remote user interface system of claim 12 wherein said monitor and  
control system includes a distribution monitor and control module for obtaining operating  
state information from said power distribution subsystem.

22. The remote user interface system of claim 12 wherein said remote  
browser application is an internet web browser application.

95 23. A method of controlling a telecommunications power system,  
comprising:

delivering an executable applet to a browser application running on a  
computer that communicates with said telecommunications power system via a  
network;

100 using a processor powered by said power system to obtain operating state  
information about said power system;  
communicating said state information to said applet via said network;  
sending control information generated by said applet to said processor via  
said network; and  
105 using said control information to change the operating state of said power  
system.

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110 24. The method of claim 23 further comprising using said processor to  
store said state information in a database administered by said processor.

115 25. The method of claim 23 further comprising using said processor to  
store said control information generated by said applet in a database administered  
by said processor.

120 26. The method of claim 23 further comprising generating a user interface  
display within said browser application that includes said state information.

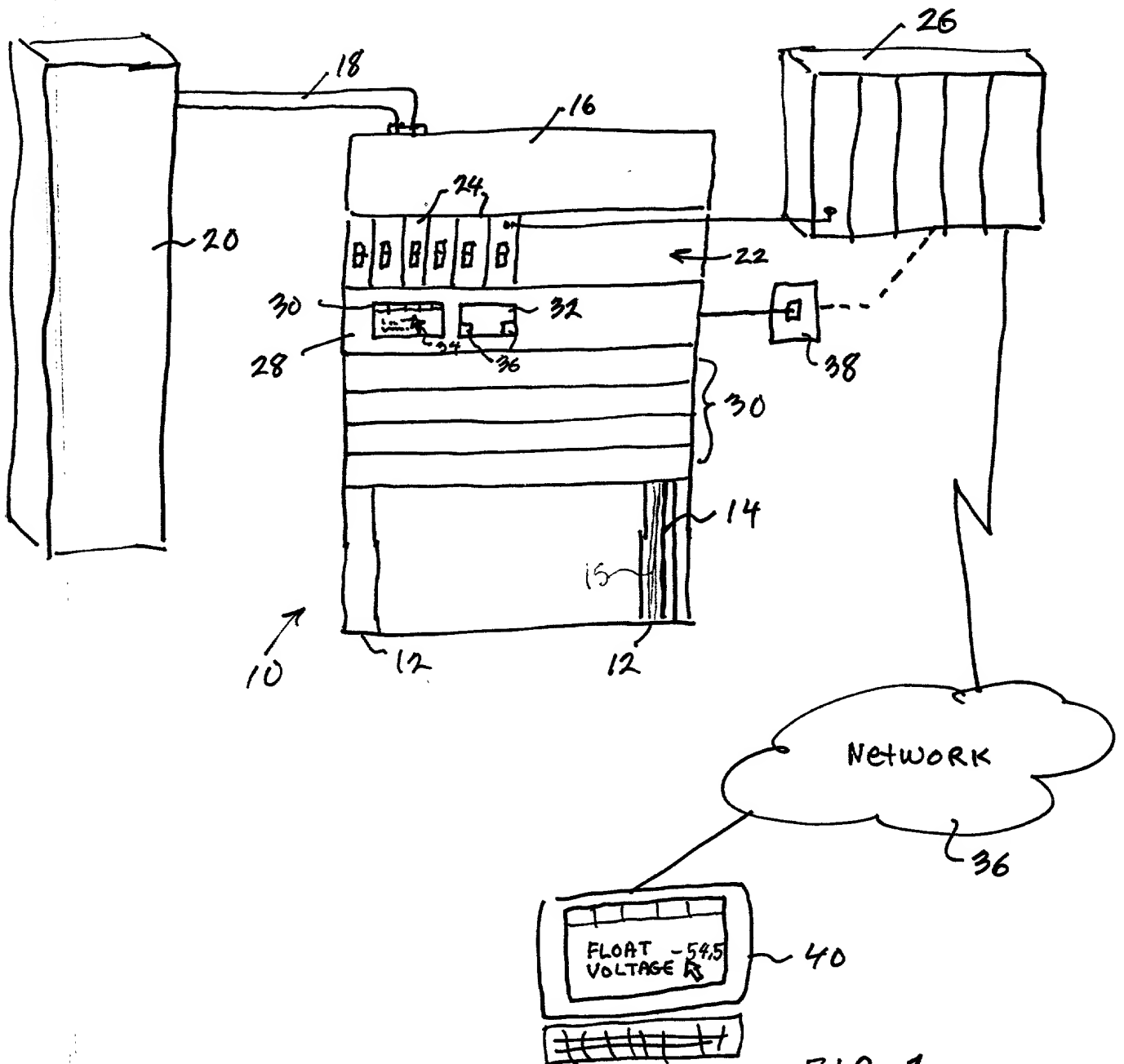
27. The method of claim 23 further comprising generating a user interface  
display within said browser application that includes static information and dynamic  
information, the dynamic information being based on said state information.

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## **ABSTRACT**

The modular master control unit of the telecommunications power system communicates via a data bus with the associated modular rectifier units, distribution unit(s) and battery connection unit(s) to collect operating state information from the neuron processors of those units and store that information in a database. The master control unit also controls the operation of the associated modular units by supplying operating state information, based on values stored in the database. The user interface manager module provides local user interface control over the system by allowing the user through a local display screen and touch pad to read from and write to the database. By downloading an applet to a remote computer running a web browser, the user interface manager allows users at remote locations to perform the same control and monitor functions as a user at the local site. The applet runs within the standard browser and communicates with the user interface manager using TCP/IP protocol.

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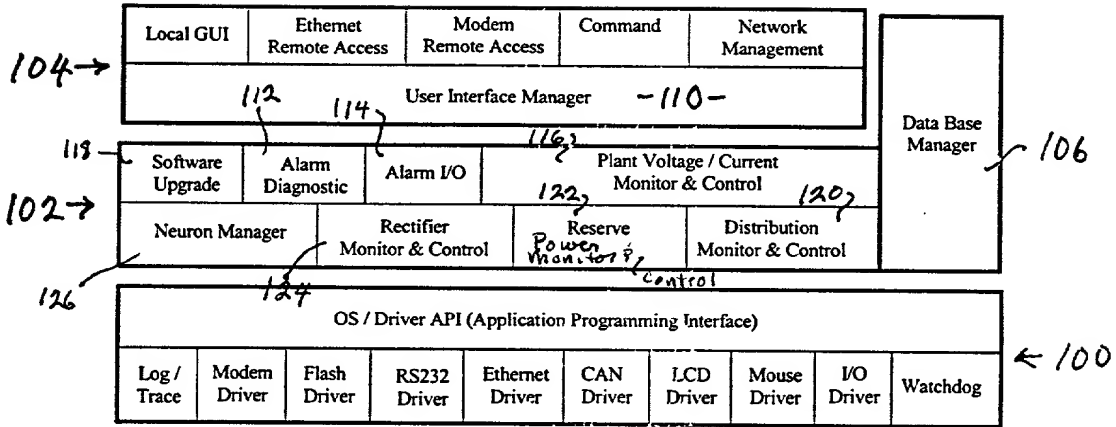


FIG 2

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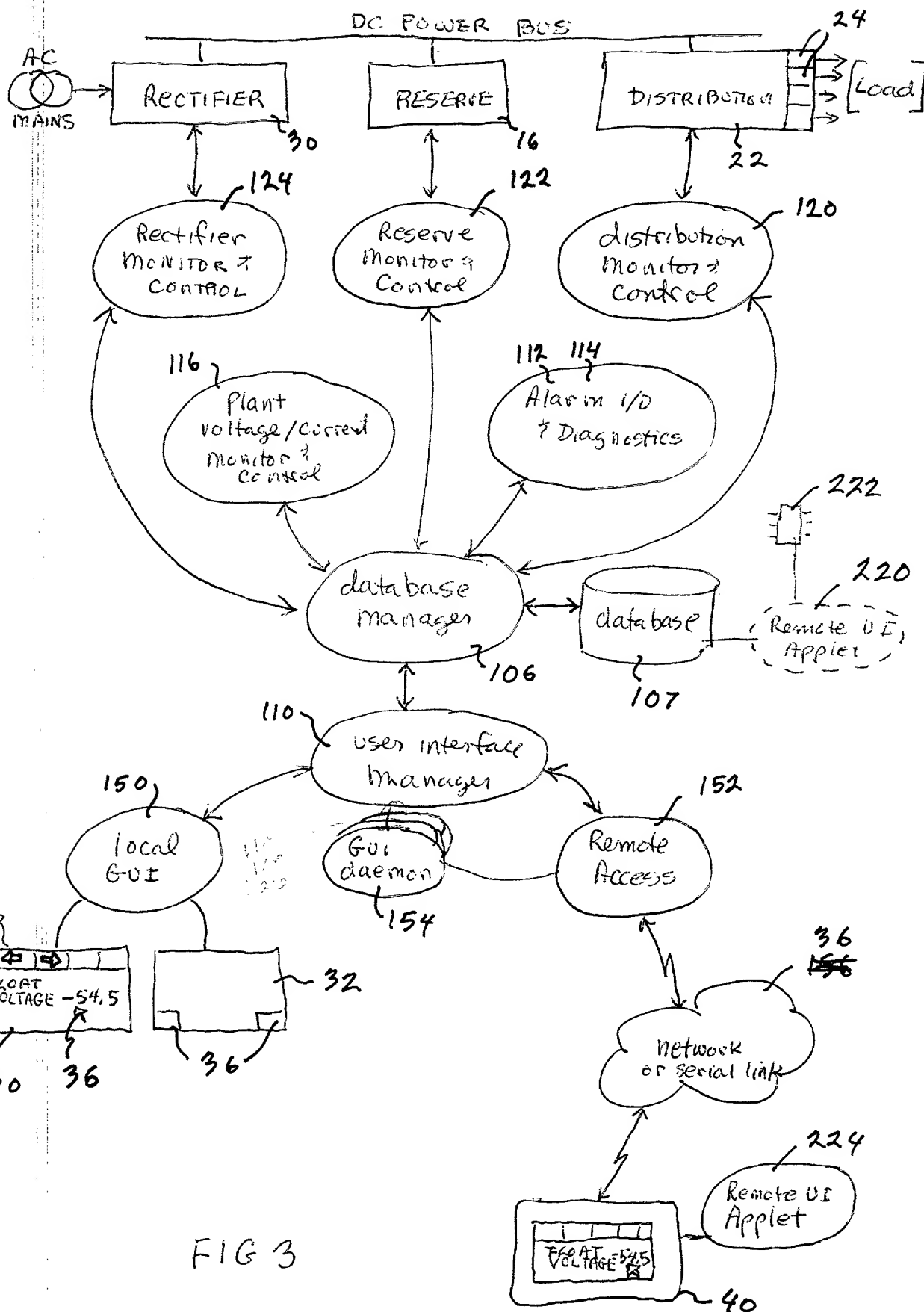


FIG 3



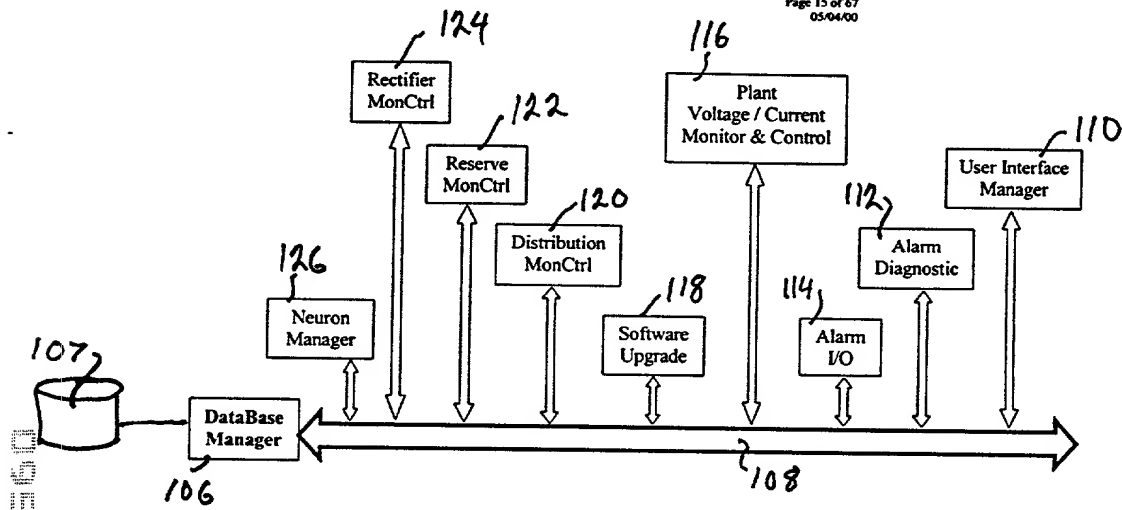


FIG 4

## Functional links from the GUI main page

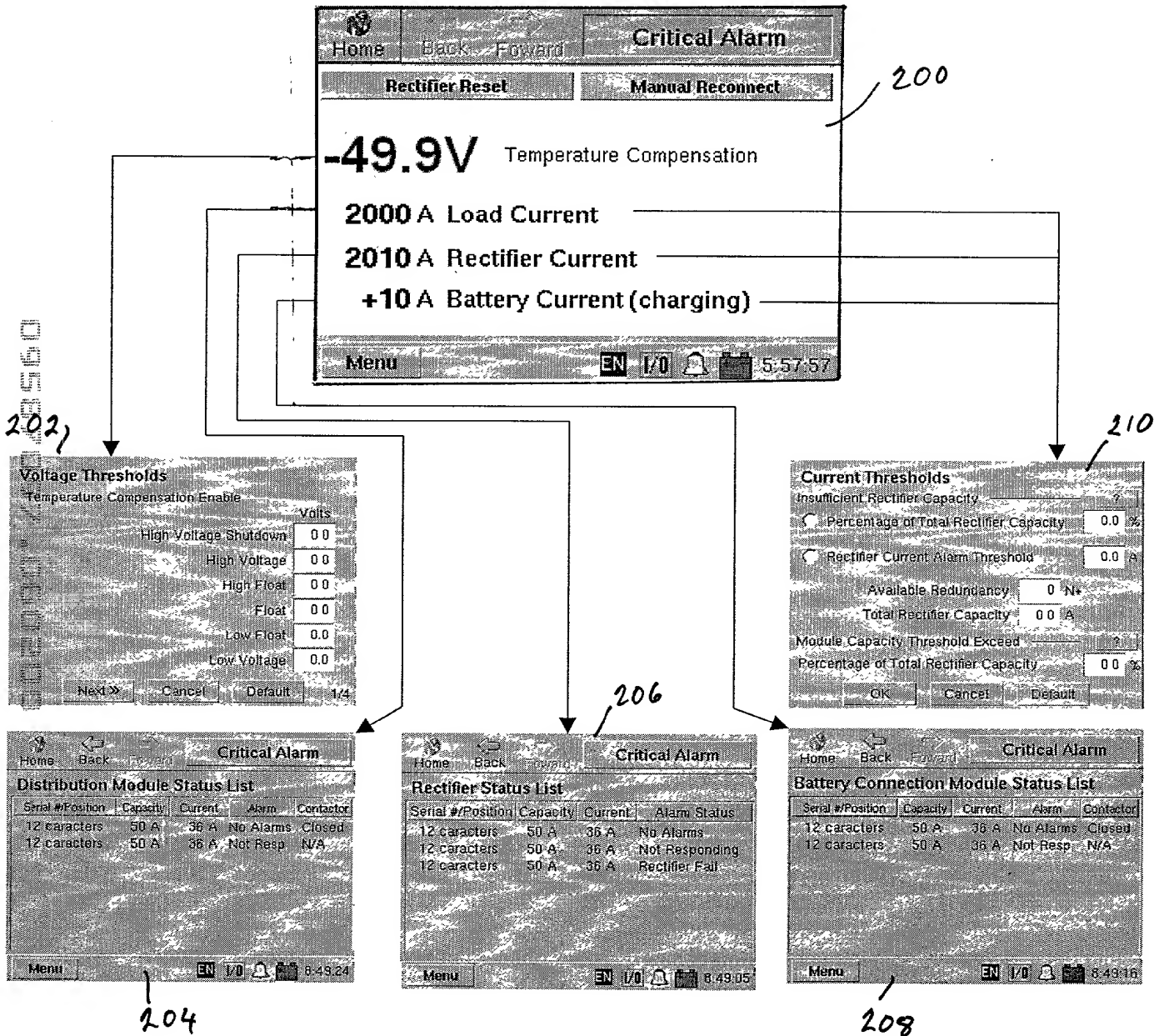
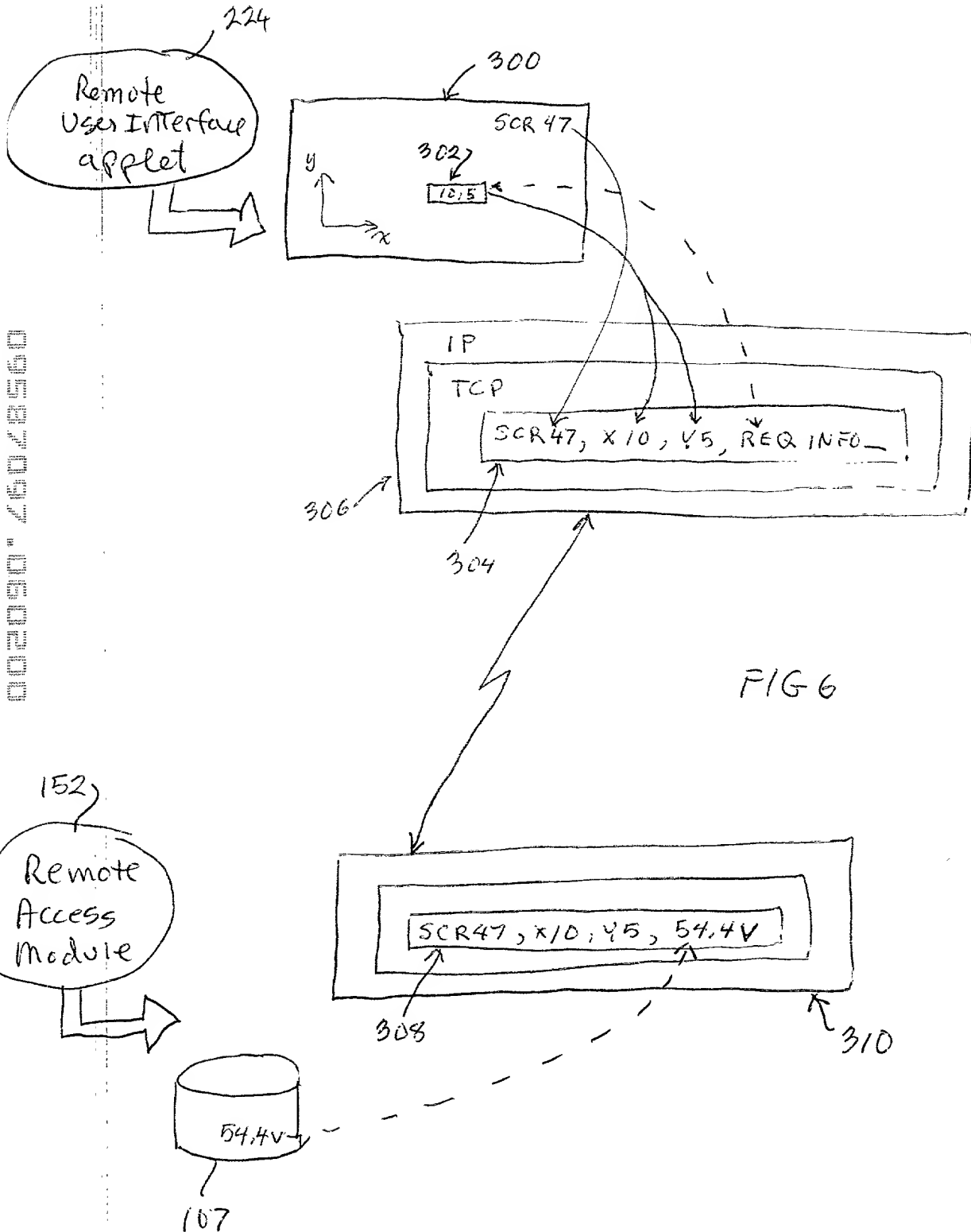


FIG 5

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## DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

### BROWSER-ENABLED REMOTE USER INTERFACE FOR TELECOMMUNICATIONS POWER SYSTEM

the specification of which (check one)

☒ [ X ] is attached hereto.

☐ [ ] was filed on \_\_\_\_\_ as Application  
Serial No. \_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application or to the patentability of the invention claimed therein in accordance with Title 37, Code of Federal Regulations, section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, section 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

#### PRIOR FOREIGN APPLICATION(S)

|          |           |                        | <u>Priority Claim</u> |       |
|----------|-----------|------------------------|-----------------------|-------|
| (Number) | (Country) | (Day/Month/Year filed) | Yes                   | No    |
| _____    | _____     | _____                  | _____                 | _____ |
| (Number) | (Country) | (Day/Month/Year filed) | Yes                   | No    |
| _____    | _____     | _____                  | _____                 | _____ |
| (Number) | (Country) | (Day/Month/Year filed) | Yes                   | No    |
| _____    | _____     | _____                  | _____                 | _____ |

## DECLARATION AND POWER OF ATTORNEY

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States Provisional application(s) listed below:

### PRIOR PROVISIONAL APPLICATIONS

\_\_\_\_\_  
(application serial number)

\_\_\_\_\_  
(Month / Day / Year filed)

\_\_\_\_\_  
(application serial number)

\_\_\_\_\_  
(Month / Day / Year filed)

I hereby claim the benefit under Title 35, United States Code, section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

| Application Serial No. | Filing Date | Status - patented,<br>pending, abandoned |
|------------------------|-------------|--|
| _____                  | _____       | _____                                    |
| _____                  | _____       | _____                                    |
| _____                  | _____       | _____                                    |
| _____                  | _____       | _____                                    |

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint Gregory A. Stobbs, Reg. No. 28,764, and each principal, attorney of counsel, associate and employee of Harness, Dickey & Pierce, P.L.C., who is a registered Patent Attorney, my attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. I request the Patent and Trademark Office to direct all correspondence and telephone calls relative to this application to Harness, Dickey & Pierce, P.L.C., P. O. Box 828, Bloomfield Hills, Michigan 48303 (248) 641-1600.

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Date: \_\_\_\_\_

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Citizenship: Canadian

Post Office Address: same as above

**Full name of third joint inventor**, if any: Christian de Varennes

Third Inventor's signature: \_\_\_\_\_

Date: \_\_\_\_\_

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Citizenship: Canadian

Post Office Address: same as above